



## MORALITY, SCIENCE AND TECHNOLOGY IN EDUCATION

**Boris Aberšek**

*University of Maribor, Slovenia*

### Background

One of the important tasks of today's education is to answer the question of "What are the moral and ethical issues associated with the use of advanced learning systems and modern learning environments, supported by AI methods?" Concrete responses could include the development of a recommendation, regulations and standards (some kind of test), on the basis of which one could assess whether an intelligent accessory (program or algorithm) for learning can ensure the students to acquire all the cognitive, social, and emotional competences, i.e., whether it is 'safe' to be used in the educational process. The development of such a "test" could affect the development of various similar 'security' tests of AI usage in other areas.

Ethical dilemmas in AI often involve high-profile incidents that shed light on the complex interplay between technology and ethical considerations. One of the prominent ethical dilemmas in AI refers to MIT's game-like platform experiment of self-driving cars, which presents challenges in balancing autonomy with accountability. Accidents involving autonomous vehicles raise questions about liability and responsibility. As AI systems gain autonomy, ethical frameworks must evolve to establish clear lines of accountability and responsibility.

Consider the following (moral) predicament: *can machines (AI, robots) think?* This question first appeared ages ago, in the distant year 1637, when Descartes already claimed that no machine (he called them automata) would ever be capable of symbol manipulation, enabling it to form sensible sentences on the basis of which one could ascribe its reason. After centuries of waiting and abstract machines, the idea of a thinking machine - received a new impetus with the arrival of the first electronic computers in the 1950s. In 1956, during the famous Dartmouth Conference, a new discipline, called artificial intelligence, was born.<sup>1</sup> Its goal was not merely to simulate thinking but to build a machine which would think in the genuine sense of the word. Today, AI is sometimes defined as ".../ the study of how to build and/or program computers to enable them to do sorts of things that minds can do" (Boden, 1990, p. 1).

Some authors propose a different definition of AI, describing it as ".../ the science of intelligence in general /..." (Boden, 1990, p. 1) with a goal of explaining (or even reproducing) various capacities of the mind. Moreover, AI researchers try to establish whether intelligence can be realized also in some other way that would differ from the way in which human brains use it. Since the attempt does not include either the knowledge or use of computer technologies but rather the development of abstract principles that are organized in an appropriate way, the differences between artificial intelligence, psychology and philosophy vanish. The subject of research is always the same regardless of the discipline and the tools used. All these insights gave birth to a new scientific field called *cognitive*

---

<sup>1</sup> Here, the word 'intelligence' is taken to mean executing cognitive operations, and the word 'artificial' means that these operations are not being carried out by humans (or animals) but by machines, i.e., by something that is not a result of the work of nature, but of a man or machine (or program, or system).



science, which adopts the idea and represents coherent research of cognition, intelligence, and the mind (Aberšek, 2015, Markič & Bregant, 2007).

### Moral and Ethical Imperatives in AI

Any technology as powerful as AI, especially generative AI (for example, large language models (LLM)), provokes many general as well as ethical questions. The increasingly faster hardware and the progressively optimized software in the realm of computers have, during the course of the past few years, stimulated and disturbed academic philosophy, which quickly began pointing out the ethical issues that might arise with the use of AI. Saying that such problems are a thing of the distant future is not something philosophers and researchers of AI would agree with. Ray Kurzweil predicts that by 2029, machines will be more intelligent than humans (Kurzweil, 2006). Stephen Hawking claims in one of his interviews that AI will develop on its own, which will help it to progress faster, and this will present the main threat to the existence of the human species. Nevertheless, the problems of implementing AI into our lives are not a thing of the distant future or strictly a matter of academic and scientific discussions. Artificial life forms (ALF) and LLM are already used in everyday life as an aid for accomplishing tasks more efficiently and for maintaining and even creating interpersonal relationships (Aberšek, 2023, Aberšek et al., 2023).

This is no different when it comes to the field that is vital to human society, as it develops interpersonal relationships and culture, and determines society in general. This is the field of education, which is set with the relationship between teachers and students, more precisely, with their behaviour in the process of conveying and acquiring knowledge (Lamanauskas, 2022). So, what is required to make AI and learning environments based on AI “ethical”? Below are some considerations of possible solutions.

#### *Anticipate Deliberate Misuse*

Systems engineers do not expect to build waterproof networks or find every security flaw imaginable. They assume that machines will be compromised, and design resilient systems that minimize damage. Code is not created and released once; it is a living thing which requires constant patching and monitoring. Anticipating and reducing the scope of online harassment needs to be based on similar assumptions. If one writes code that talks to people, such as Siri or Alexis, it is inevitable that eventually it will say something terrible. This is why chatbot authors typically include basic checks on hurtful language and carefully monitor their bots’ activity. This seems obvious, but just recall the case of Microsoft’s Tay. The Tay bot was easily fooled into repeating hate speech and could be made to direct that speech at innocent people. It was a PR disaster, and the bot was taken offline within 24 hours of its launch. The team behind it acted irresponsibly by not taking obvious steps towards abuse mitigation, like a blacklist of offensive terms and strict limits on @-messaging.

*Creators need to assume that their work will be used to harm other people and work backwards from that assumption.*

#### *Consider How Code is a Powerful Amplifier*

When one inserts AI into a social environment, one must keep in mind that the AI could be, in some respects, super-intelligent (Aberšek et al., 2023). An unstated assumption could be that the AI code that writes a novel will be far shorter than the novel which it produces. The computer doesn’t care. AI’s amplification potential directly plays into its ability to cause social havoc: a bot can tweet one message to 1,000 people as easily as 1,000 messages to one person. There are less overtly harmful implications, though. For example, somebody filling the Twitter geodata space with misinformation, which has been noticed more than once.

#### *Scale, Malice and AI Illiteracy*

People should be concerned about (the scale of) AI malice and illiteracy, and especially about all these principles being violated together (i.e., an intent to harm, amplified by code, compounded by poor understanding of machine-generated media). And the problem is that this is probably already happening. Perhaps generative artists can slow this tide. The misuse of tools must be anticipated, and people need to consider whether they are really worth building. One should endeavour to work transparently– projects can inform as well as entertain. The antidote, as well as the poison, should be designed: can AI-generated media be detected as easily as they are created?



## How Forward

Transparency in AI algorithms is crucial to address ethical and moral concerns. Future AI deployments must prioritize transparency, accountability, bias, societal impacts and regulatory frameworks, fairness and the prevention of discriminatory outcomes to ensure accountability and build trust among users. Real-world cases of ethical dilemmas in AI decision-making provide valuable insights for shaping future deployments. These cases emphasize the need for transparency, inclusive design, ethical frameworks, and a proactive approach to addressing biases. Learning from past incidents will contribute to the responsible development and deployment of AI technologies, ensuring they align with ethical and moral principles and societal values.

## The Possibilities of Using AI in Education

- *Student Evaluation*  
An intelligent program can automatize an entire process of evaluation and unburden the teacher, enabling them to focus on qualitative aspects of lessons.
- *Individualization of Learning*  
Intelligent devices are essentially devices the user interface of which and interaction with them are highly individualized.
- *Improvement of Seminars*  
The drawbacks of the seminar are not always obvious, and the AI may help the teachers to uncover them.
- *Searching for Information*  
Users seldom pay attention to the AI systems that customize information for them every day. The customization parameters are based on, for example, locations (Google), purchase history (Amazon), or an individual's needs and demands (Siri).

## References

- Aberšek, B. (2023). Science and the Artificial Life Form (ALF). *Problems of Education in the 21st Century*, 81(1), 4–8. <https://doi.org/10.33225/pec/23.81.04>
- Aberšek, B., Pesek, I., & Flogie, A. (2023). *AI and cognitive modelling in/for education*. Springer.
- Aberšek, B. (2015). Changing educational theory and practice. *Problems of Education in the 21st Century*, 66, 4–6. <https://doi.org/10.33225/pec/15.66.04>
- Boden, M. (1990). *The creative mind: Myths and mechanisms*. Basic Books.
- Kurzweil, R. (2006). *The singularity is near: When humans transcend biology*. Penguin.
- Lamanauskas, V. (2022). Natural science education in primary school: Some significant points. *Journal of Baltic Science Education*, 21(6), 908–910. <https://doi.org/10.33225/jbse/22.21.908>
- Markič, O., & Bregant, J. (2007). *Narava mentalnih pojavov* [The nature of mental phenomena]. Aristej.

Received: October 29, 2024

Revised: November 18, 2024

Accepted: December 03, 2024

Cite as: Aberšek, B. (2024). Morality, science and technology in education. *Journal of Baltic Science Education*, 23(6), 1116–1118. <https://doi.org/10.33225/jbse/24.23.1116>



**Boris Aberšek**



PhD, Professor, Faculty of Natural Sciences and Mathematics, University of Maribor, Koroška cesta 160, 2000 Maribor, Slovenia.  
E-mail: [boris.abersek@um.si](mailto:boris.abersek@um.si)  
Website: <https://scholar.google.com/citations?user=aRid0w4AAAAJ&hl=en>  
ORCID: <https://orcid.org/0000-0002-4198-4240>

